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## Issue Brief #3

### THE NEXT GENERATION NETWORK: WHAT WILL THE TELECOMMUNICATION MARKETPLACE OF TOMORROW LOOK LIKE?

*The ways in which the world communicates are undergoing radical change thanks to a complex combination of technological, economic, political and social factors. This series of background briefings from Telcordia Technologies Inc. attempt to chart the impact of these changes on the networks and services we use in our business and private lives. They show how we can smoothly evolve towards what the industry is calling the "Next Generation Network" – common networks capable of handling data, voice and multimedia communications.*

*This issues brief focuses on one aspect of that evolution – the effect that new technologies and the continued liberalization of telecommunications regulations will have on the future shape of the whole services marketplace. Acronyms are explained in a glossary at the end of the document.*

#### What are the drivers for change?

**Ever cheaper and more powerful processing.** This is the central engine of change across the whole of high technology and relates to the practical application of what has been called Moore's Law, after Gordon Moore, one of the founders of Intel. Moore's Law predicted that the processing power of silicon chips would double every

year, while halving in price every 18 months. Although some engineering limits are now being reached, new semiconductor technologies continue to emerge.

**Advances in communications technologies.** While many of these rely on the increases in the raw processing power mentioned above that allow signals to be switched and managed more efficiently, there have been significant developments in other fields. Among these are:

- Innovations in optoelectronics leading to a near exponential expansion in the amount of data that can be carried by fiber optic cables, now reaching terabit-per-second speeds.
- The development of new digital wireless systems such as GSM, CDMA and UMTS, enabling the radio spectrum to carry far more communications traffic at very high quality and deliver mobile web access and video services.
- The widespread adoption of extremely flexible packet-based communications techniques such as Internet Protocol (IP) that will eventually replace the large and expensive telecom switches and exchanges currently in use.
- The evolution of technologies and infrastructures – ISDN, xDSL and CATV – that will give ordinary subscribers access to very high bandwidth services for combined video, voice and data applications in the home.

- The introduction of 'intelligence' into the network, allowing services such as FreePhone and Personal Number to be developed for the needs of individual businesses or personal use and the Internet to interact with the public telephone network.
- The increasing familiarity among all types of users with the use of the Internet and WWW as a ubiquitous communications interface for information searches, carrying out financial transactions and purchases, and accessing entertainment and new media.
- The development of digital media technologies such as MP3 and RealPlayer that allow music and video to be transmitted over relatively low speed communications links.
- The possibilities of unified messaging applications that can translate voice, e-mail and fax messages into the most appropriate medium for receipt by a mobile user.

**Maturity of supporting IT systems.** The actual installation of a telecommunications network – the fiber backbone, the switches, the access links to users – is only one part of delivering a profitable and reliable service. Equally important are all the support systems that actually turn that network into a viable business. These include systems to bill users, to create and manage services across the network, to monitor failures of plant and expedite repairs, and to plan traffic capacities to ensure the optimum use of equipment. Here, increases in the basic computer processing power available have been complemented by significant advances in software engineering. Previously, each support system operated independently and could only communicate with others with great difficulty, causing major inefficiencies or a reliance on expensive human labor.

New systems, using object-oriented software techniques, mean that changes in one part of the system or network cause automatic updates across all related systems, creating a near-seamless environment for service creation, delivery, billing and customer relationship management. As

telecommunications becomes more competitive, with more choices being offered to increasingly fickle customers, the importance of all these support systems can only increase.

**Political change.** In most countries, telecommunications was traditionally seen as of such strategic importance to the nation that services were provided by state-owned utilities. As the political philosophies of much of the world shifted away from state control and ownership, and towards private enterprise in the 1980s and 1990s, these existing telecom monopolies were challenged and regulatory regimes were liberalized. In addition, many developing countries recognized the importance of telecommunications in underpinning economic and social growth and encouraged inward investment by new operators.

Competition has usually been introduced to once closed markets in a series of standard phases, beginning with the opening up of the commercial data communications services market, followed by the entry of mobile operators, the development of competition in long distance and international services, and the freedom for CATV entertainment providers to offer telephony services over cable networks. In many parts of the world, the final stage has been reached, with operators of all types able to compete in providing domestic voice telephony services to the mass market. Complementing this, parts of the radio spectrum have been opened up from military and other closed-group use and are being auctioned off by governments for fixed and mobile voice, data and multimedia communications services.

**Commercial change.** The political shift towards open markets has also driven the increasing globalization of world trade and the development of multinational corporations. For these to operate effectively across different time zones and regions, telecommunications is crucial. This factor has driven technological, regulatory and infrastructure development, with business location often dictated by the quality of local communications. In turn, increasing competition has led to a greater emphasis on

speed of response, time to market and the integration of the activities of distributed workgroups, workers and outsourced suppliers. Whether it's the highly mobile international executive or the home-based teleworker, it is telecommunications that has made these new ways of doing business possible.

Incumbent telecommunication operators, while often facing part privatization, have also confronted intense pressures as a result of the emergence of leaner and fitter competitors, usually using new technologies, while they themselves have the inheritance of aging legacy networks and systems. Major change in their strategies and organizational structures has had to be engineered at short notice and the traditional public service utility culture of most existing operators has undergone a shift towards a business-oriented, customer focused environment.

As open market concepts have spread, a bewildering array of alliances, partnerships and investments has sprung up to provide both national and international telecommunication services to business and residential users. Many operators are now seeking to add value to their services to customers and differentiate themselves in increasingly crowded markets. At their simplest, these involve providing services such as Friends and Family or Caller ID to ordinary subscribers; at the more complex end, they involve outsourcing advanced IT business applications from business customers onto their networks.

### **What are the telecommunication markets of tomorrow?**

Risk and uncertainty, familiar enough in the IT sector, have entered the once stable telecommunication industry. The interaction of all the factors outlined above has created an environment where change is constant. The central challenge for the industry lies in creating a stable Next Generation Network platform that can support operators, service providers and users efficiently and profitably for the foreseeable future. A significant

portion of this challenge involves integrating the existing public switched network with packet-based technologies.

Until recently, the business of telecommunications operators centered around providing basic voice services – dial tone – to a mass market, and voice and data communications connectivity and services to large and medium businesses. Changes in lifestyles, business practices, technologies and service possibilities mean that a once simple market is currently fragmenting. It is now possible to consider the concept of the 'personalized communications environment' – a mix of mobile and fixed voice, data and media services bundled, tariffed and marketed on a tailored basis to individual users, with the additional freedom that these users can control and change these services at will.

Looking at the mass market in this way, it is possible to visualize different market sectors evolving out of a once undifferentiated whole:

**Basic Voice Services** – for the majority of the population, these will continue to be the basic staple communications requirement. Although data traffic has already outstripped voice as the proportion of total communications traffic on the world's networks, voice is continuing to grow at around 5% a year. Use of advanced services such as Caller ID, conferencing, call forwarding and personal numbering will increase, while penetration of mobile voice and communications into the mass consumer market will continue.

Internet technologies will have an impact on both the cost and the functionality of voice services. The ability to provide high quality voice communications over a packet network using IP and deliver advanced voice services as well will both dramatically lower the cost of voice calls as well as lead to an increase in interactions between the world of the Web and the public voice network. Users will be able to control their services and access billing information through Web-based interfaces or 'smart' terminals, and call center services will evolve to mix the

two environments for e-commerce applications.

**Integrated Voice and Data Services** – these will be targeted at the top end of the domestic market, at SOHO, SME and mobile business users, and at the younger early adopter of technology (or “gadget head”). Building on wideband and broadband copper and wireless technologies (xDSL, HFC, FWA, GPRS and UMTS) and on the shift towards IP and packet technologies that can carry voice, data and multimedia traffic simultaneously, users will be able to switch between different communications applications such as web browsing, e-commerce, entertainment, e-mail, and voice using similar interfaces on different devices for their control.

Content and its presentation will become increasingly important in this scenario, as will quality of service, reliability and security.

### **Who will be the suppliers of these services?**

Currently, the telecommunications services marketplace is divided into relatively clear market sectors. However, the rapid nature of technology change, the growing sophistication of users, the effects of continued market liberalization and a natural evolution of business strategies mean that there is a blurring of once clearly defined boundaries. One way of viewing the market is to see it as composed of different levels, each adding value in some form or another to basic connectivity.

**Basic Network Transport Services** – At the core of any national or international telecommunications service, irrespective of who the operator is or what the traffic is composed of, lie the long distance trunks that link switches. Once dominated by the traditional PTTs and renowned for high prices, this market has been revolutionized by the entry of new operators using the latest fiber optic technologies to carry immense amounts of traffic at extremely low prices. Without the burdens of old plant and the costs of delivering services to individual

domestic subscribers that the PTTs face, new operators targeting this market are able to provide extremely cost-effective services between major city centers for large corporate users, for other new operators and for ISPs.

**New Telecommunications Service Providers** – Using new fiber routes for their backbone transmission, and interconnecting with the existing PTT's lines to reach business and domestic subscribers, these new operators can create and deliver services on their own switches. Again, without the heavy overhead of countrywide plant to maintain, they can focus their attention on creating and marketing innovative services, often aimed at specific market sectors. Examples of these might include discount calling cards, traveler and tourist services, Virtual Private Networks for businesses, and call center operations.

**Mobile Service Operators** – Where the simple fact of mobility was once enough to attract customers, increased competition is leading to mobile operators trying to differentiate themselves on the basis of their services and by creative tariffing and marketing. In many countries, mobile networks offer services more advanced than those available on the fixed network and, with the emerging ability to locate a user's position precisely and coverage and voice quality improving all the time, mobile operators are beginning to compete against fixed operators for domestic service provision through “Home Zone” services.

In addition, the increasing amount of ‘intelligence’ in the network is helping bring together these once separate worlds of fixed and mobile communications, so that the same service can be accessed through both fixed and mobile phones. Calls, depending on the caller, time of day, and other factors, can be directed to a number of fixed and mobile phones or to voice mail – with the user presented with a single bill.

Mobile communications is currently limited to far slower data exchange rates than those available on wired networks. New digital mobile wireless technologies such as GPRS,

EDGE and UMTS will bring the functionality of the Internet and its related applications to mobile users. Smart cards in the handset will allow it to be used for e-commerce applications, either remotely or on the spot, while data on the user's position will drive the growth of location-based services, such as directing people to nearby travel, entertainment, retail, or other resources. As a result, content provision and individualized marketing will become extremely important in the mobile sector and portal-type services will adapt for this environment.

### **Alternative Infrastructure Operators –**

The effective stranglehold that existing PTTs have on the great majority of subscribers through ownership of the lines to each household and most businesses can slow down customer choice and the growth of competition. In addition, the existing copper wires that carry the telephony signals were not designed to carry the high speed data that is needed to deliver efficient advanced multimedia services. While these can be upgraded with xDSL technologies to carry high-speed signals, it is an expensive and time-consuming process. As an alternative, some new operators are linking their customers directly to their network through CATV in urban areas or fixed digital radio links in rural situations, to provide high capacity two-way services.

**Internet Service Providers –** From a background, usually as small companies offering basic access to the Internet for small numbers of dedicated enthusiasts, these now face an interesting future. Along with portal companies, ISPs' market worth far exceeds their earnings or assets, but they are seen as possessing a route to the consumer – and an understanding of their buying and viewing habits – that telecommunications companies have yet to develop. Given that voice communications can be transmitted over the Internet and controlled through a browser interface, that unified messaging can consolidate once separate communications media, and that liberalization is continuing to open up the public network for direct access to subscribers, some ISPs may evolve into

Next Generation telecommunications operators.

The last 10 years have been a hectic time of change in telecommunications, with new technologies such as IP, fiber-optics and digital wireless creating entirely new network infrastructure possibilities. Although technology change will continue, the industry's focus is now shifting towards improving and developing the systems and processes, businesses models and cultures that are needed to turn these technological building blocks into viable enterprises.

As choice in telecom services becomes available to ordinary users and basic connectivity becomes a commodity, operators will have to place more emphasis on adding value to customer relationships. Improvements will be needed in the way that networks are managed and services created and delivered over multiple networks, to guarantee quality of service, to speed provisioning and to maximize return on investment. In addition, the role of billing and customer record systems will become crucial to understanding subscriber behaviors and developing marketing and service development strategies to win market share.

Amongst these strategies, the bundling together of different services into a single offering will become increasingly common. As the underlying technologies of voice and data become integrated, so too will the services that they make possible. Fixed and mobile communications, Internet service and access to information and entertainment content will be packaged in different ways. What was previously one mass market for simple dial tone will fragment into many niche markets, based on individual lifestyle and business requirements.

### **About Telcordia Technologies**

Telcordia Technologies Inc., an SAIC company, is the world's largest provider of operations support systems, network software and consulting and engineering services to the telecommunications industry. As the leader in the development of next generation network architectures, the

Telcordia software organization has earned CMM Level Five from the Software Engineering Institute at Carnegie Mellon University, the highest software quality recognition available. Telcordia employs more than 7,000 professionals and has revenues of more than US\$1.5 billion. Telcordia is headquartered in Morristown, New Jersey, with offices throughout the United States, Europe, Central and South America and Asia Pacific.

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